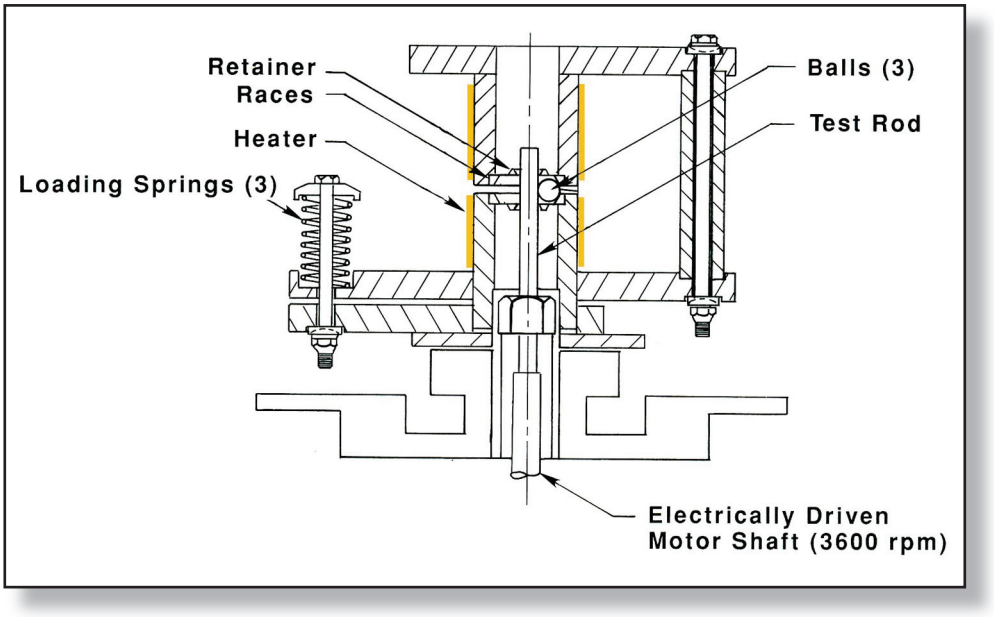
Air Force Research Laboratory|AFRL
Science and Technology for Tomorrow's Air and Space Force

Success Story

BEARING TESTER ADVANCEMENT IMPROVES TURBINE ENGINE FLIGHT SAFETY, RELIABILITY, AND PERFORMANCE



The sustained performance of turbine engine bearings is one of the most critical factors in safe and reliable operation. The rolling contact fatigue (RCF) tester provides an excellent cost-effective screening technology to assure current and future generations of jet engines can achieve maximum engine service life. By pre-testing aerospace bearing and lubricant material for compatibility, the Air Force's newest and hottest running jet engines can be protected from failure.

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Accomplishment

The Propulsion Directorate's Mechanical Systems Branch designed and built an advanced RCF tester to evaluate turbine engine bearings and lubricants. The new RCF tester is used to assess material compatibilities and lubrication effectiveness by applying various bearing surface friction pressures at a rolling velocity of 3,600 revolutions per minute and at temperatures up to 700°F to simulate the most severe engine operating conditions.

Researchers evaluate the resulting effects of stress and fatigue on the test articles by using either an optical microscope, energy dispersive X-ray analysis, or a scanning electron microscope. The test throughput times vary depending on the specific test objective and the materials being tested. Overall, the directorate-developed RCF tester provides more than twice the bearing material and lubrication test capability than similar conventional testers available today. The directorate has shared its test findings with other branches of the armed services as well as manufacturers of turbine engines, lubricants, and bearings.

Background

The directorate and on-site contractor, UES, Inc., developed the RCF tester. The development work was planned under the Versatile Affordable Advanced Turbine Engines program for the United States Air Force legacy, advanced turbine engines, and commercial uses. The directorate and UES are pursuing a possible Cooperative Research and Development Agreement to produce and market the tester commercially.

Propulsion
Support to the Warfighter

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (04-PR-13)